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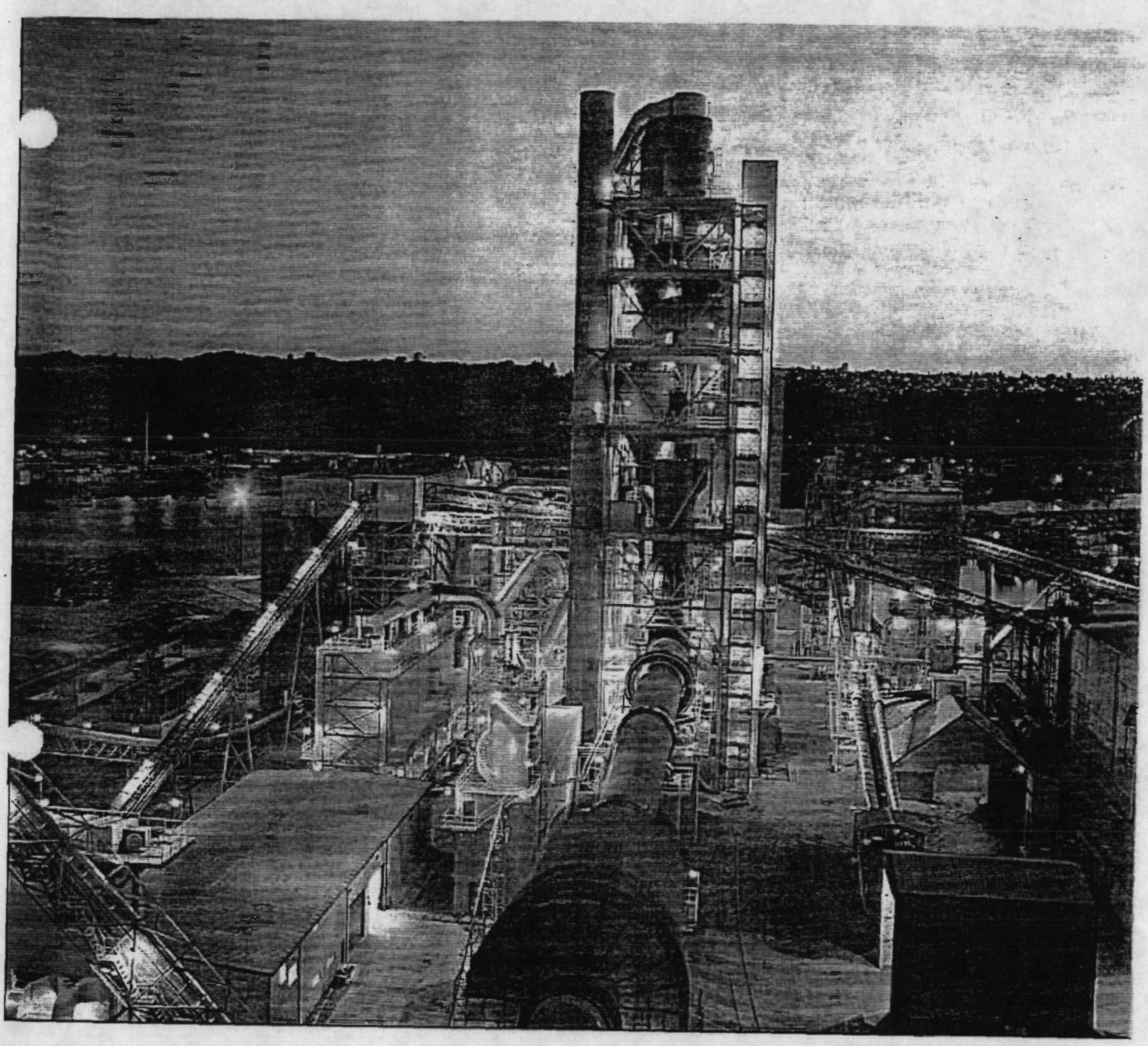
ASH GROVE FACILITY BROCHURE

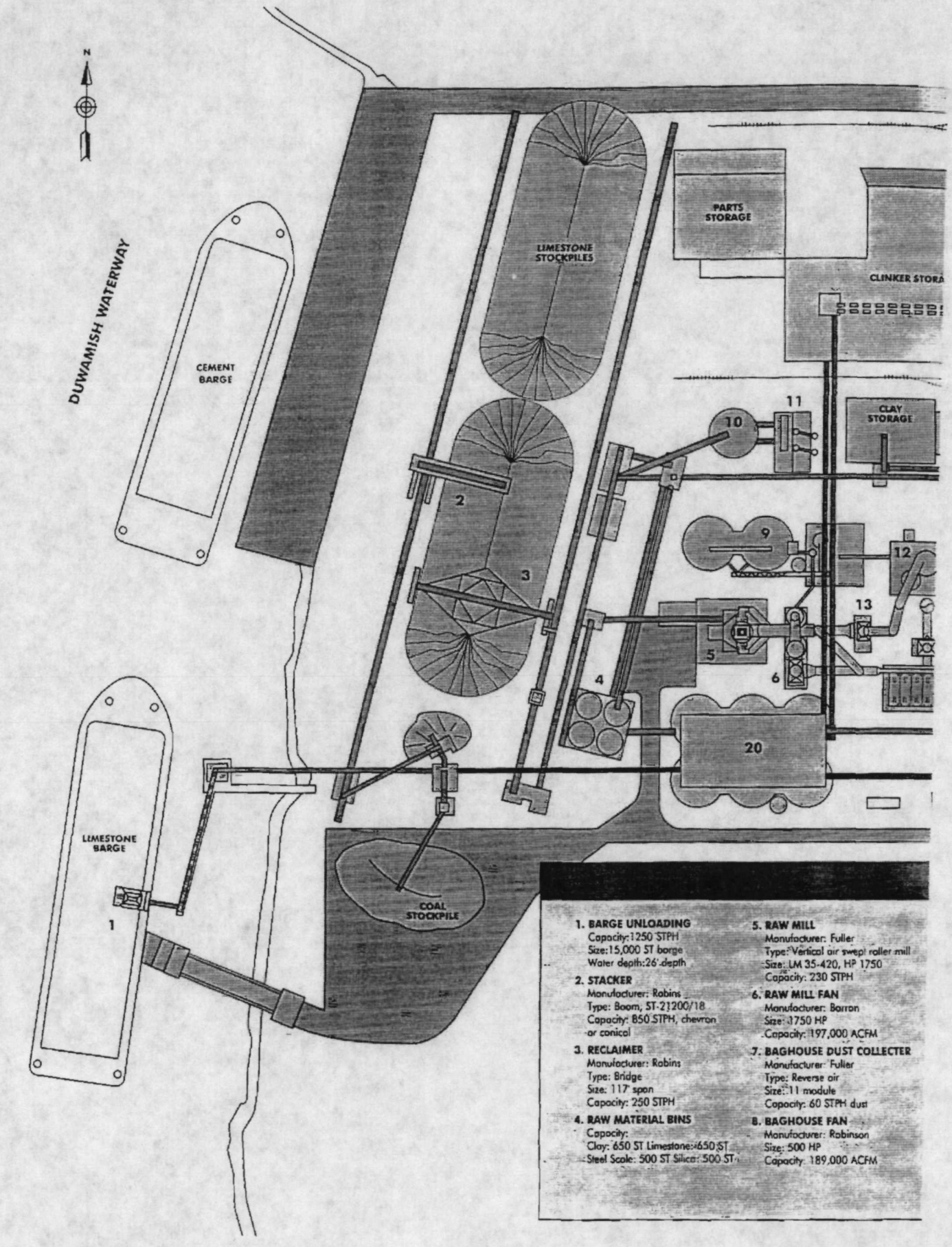


ASH GROVE

**Ash Grove Cement Company**

Seattle, Washington Plant

AGC2H000559

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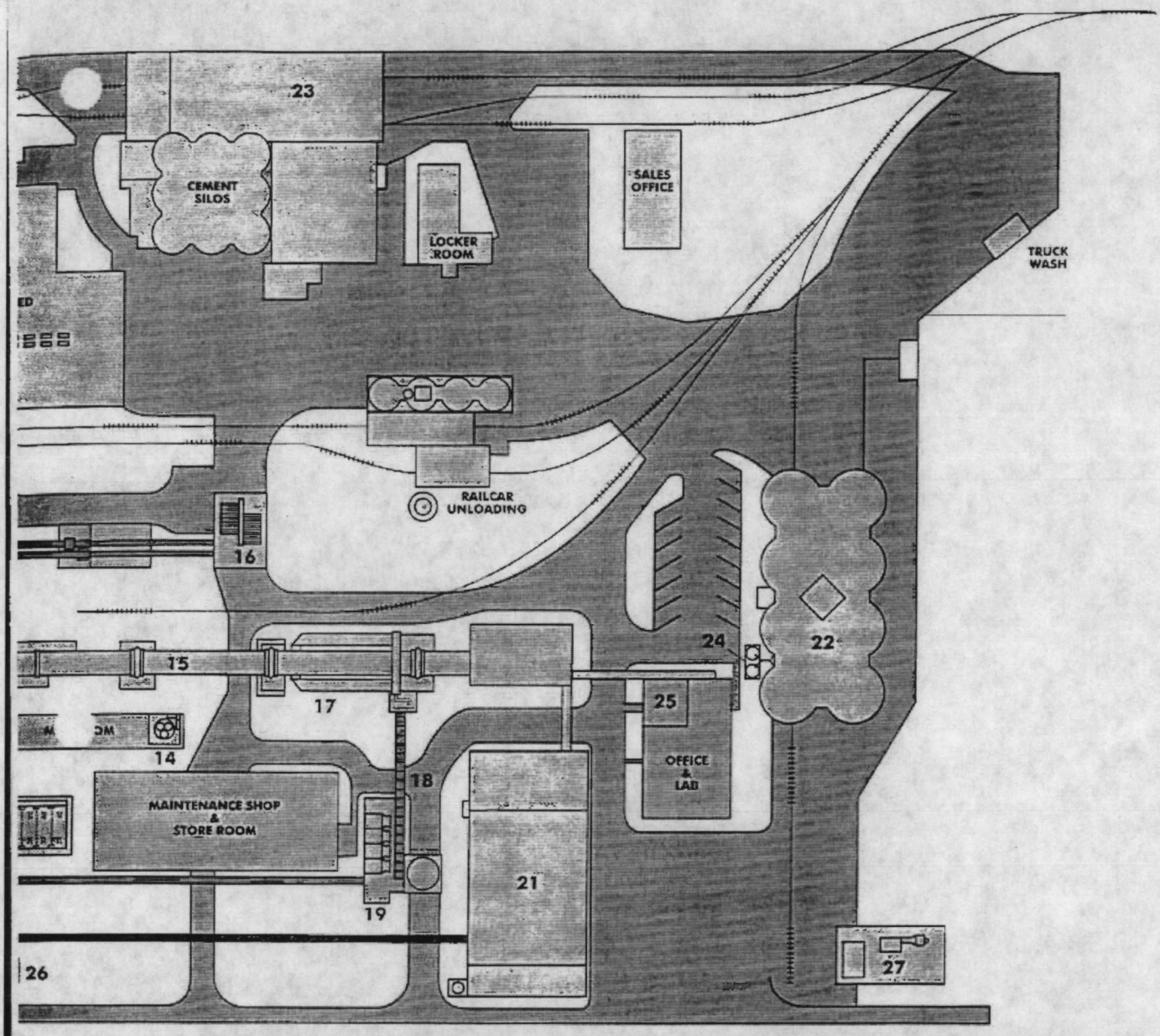


# ASH GROVE CEMENT PLANT

**1a. BLENDING SILOS** (upper level)
Size: 2-46' x 52'
Capacity: 3700 ST

**1b. STORAGE SILOS** (lower level)
Size: 2-46' x 85'
Capacity: 8,000 ST

**10. COAL SILO**
Type: Double leg
Size: 41' x 62'
Capacity: 1500 ST

**1. COAL MILLS**
Manufacturer: Raymond
Type: each 533 bowl mills
Size: HP
Capacity: 10 STPH each

**2. PREHEATER TOWER**
Manufacturer: Fuller/FLS
Type: 5 stage ILC-E preheater with calciner
Capacity: 160 STPH

**13. PREHEATER FAN**
Manufacturer: Robinson
Size: 1000 HP
Capacity: 181,000 ACFM

**14. COAL FEEDERS**
Manufacturer: Pfister
Type: Rotary feeders
Capacity: Kiln 11 STPH
Calciner. 1 STPH

**15. KILN**
Manufacturer: Fuller/FLS
Type: Rotary, 4 fire
Size: 500 HP: 15' x 309' (includes coolers)
Capacity: 2200 STPD

**16. TRUCK DUMP**
Manufacturer: Rexnord
Type: Apron Conveyor
Capacity: 200-325 STPH

**17. PLANETARY COOLERS**
Manufacturer. Fuller/FLS
Type: UNAX Tubular
Size. 9 each 7' x 6'
Capacity: 2200 STPD

**18. PAN CONVEYOR**
Manufacturer: Rexnord
Type: Pan Conveyor
Capacity 100 STPH

**19. G-COOLER**
Manufacturer Claudius Peters
Type. Gravity flow, air cooled
Capacity: 184 STPH

**20. CLINKER SILOS**
Size: 6-45' x 82'
Capacity: 25,000 ST

**21. FINISH MILLS**
Manufacturer: FLS
Type: Ball mill-dry
Size: 2 each 12' x 36'; 2500 HP
Capacity 60 STPH

**22. CEMENT SILOS**
Size: 8 each 40' x 100'
Capacity: 38,400 ST

**23. PACKHOUSE/PACKING MACHINES**
Manufacturer: Bates
Type: 3 spout impeller feed
Size: 105 FC
Capacity: 47 STPH

**24. CEMENT TRANSFER TO BARGE**
Manufacturer: Cyclonaire
Type: Dual DPG 275
Size: 250 STPH

**25. COMPUTERIZED PROCESS CONTROL**
PLC: Allen Brodley/PLC-5 series
Storage and Handling: 2 Hewlitt Packard HP 1000
DCS: FLS/SDR

**26. WATER COOLING TOWER**
Manufacturer: Fuller
Type: Cooling and Treatment
Capacity: 990-1200 GPM

**27. ELECTRICAL SUBSTATION**
Manufacturer: GE/Westinghouse
Size: 26KV/4160 V
7 MVA/10 MVA

AGC2H000561

# Ash Grove's new 2200 TPD Seattle, Washington plant comes on line during May 1992.

When Ash Grove signed the contract in April of 1990 for their Seattle plant, they became the first North American Cement Company to use the advantage of the combined technical capabilities and equipment of Fuller and F.L. Smidth. As a result, the products and technologies were selected to best suit the requirements for the individual material processes from raw material handling and grinding to pyroprocessing. Ash Grave was able to benefit fram Fuller and F.L. Smidth's experience with environmental and instrumentation and control technology.

The Seattle plant is a remarkable example of a uniquely designed process system fitting into a restricted land area in a location with very stringent environmental regulations. Guaranteed production and energy consumption levels have been achieved and the plant is currently producing a high quality praduct in a very competitive cement market.

The plant is located on the Duwamish Waterway very close ta the center of Seattle. The existing site has been utilized as a cement praduction facility since 1928. The raw materials for the new facility consist of a mixture of limestanes shipped in by barge from Ash Grove's quarry at Blubber Bay, B.C. Iron are, clay, osh and silica are trucked to the plant and stored for metering into the raw grinding process. The limestone is stored and reclaimed with a stacker recloimer capable of building one pile in a chevran pattern while reclaiming from the second pile.

Raw grinding is performed in a Fuller-Loesche LM35.42 vertical roller mill with four roilers and a nominal table diameter of 3500mm. The drive motor is a 1750 HP, 1170 RPM, squirrel cage induction motor. The vertical mill is fitted with a dynamic classifier and includes a circulating oil system for rollers.

The Fuller-Loesche mill circuit is designed for a production rate of 168 MTPH with praduct fineness of 15% residue an a 75 micron sieve. Preheater gases are utilized for drying 5% maisture in the raw feed. The system has a recirculatian duct to the mill outlet to assure contralled gas flow. The same duct provides bypass capability for preheater gas to the Fuller reverse oir boghouse when the mill is down. The gas handling system includes an eleven module suction-type gloss bag reverse air Fuller Baghouse to capture and recycle process dust.

The raw product is conveyed ta one of the two Fuller Airmerge™ blending silos located aver two storage silos, to assure the consistency af kiln feeds when changing the types af cement.

Raw meol is withdrawn from the storage silos to a loss-of-weight kiln feed bin which meters kiln feed via an impact flow meter to an airlift to feed the preheater.

An F.L. Smidth single string 5 stage preheoler with In-Line Calciner with excess air (ILC-E) was selected as the best system to satisfy Ash Grove West's requirements. The preheater vessels ore dimensioned at 5.0, 5.0, 5.4, 5.4 and 5.4 M diameters fram tap to bottom. The 4.55 x 68 M kiln system utilizes nine (9) 2.1 x 21.0 M Unax planetary cooters which were selected because af the limited space available at the plant site, high water table and the elimination of an emission point in the environmentally sensitive Seattle area. The law profile, low pressure drop 5 stage preheater system enables Ash Grove to comply with the maximum height restriction of 83 meters above sea level.

- The two existing Raymond coal mills were converted ta an indirect firing system using a new low primary air FLS Centrax burner in the kiln. Raw coal is delivered by barge ar truck.
- The plant grinds clinker in the existing cement grinding facility with two FLS 2500 HP closed circuited mills. The existing cement silos were not changed.
- An F.L. Smidth Automation Supervisary Dialogue and Reporting System (SDR) has been installed to cantrol and monitor all production stages fram four operator workstations placed in a central cantrol room. The operator workstations are controlled via two graphics controllers to twin centrol HP1000 process computer systems.
- The operolors workstation is based on the SDR/Op station system comprising 4 color CRT's and keyboards. The PLC system is based on the Allen-Brodley PLC 5/25 processor, with PLC 5/15 as co-processor for the digital and analog functions respectively.
- During a 5 day observation period, the plant produced over 2450 STPD, ar well over design rating and below guaranteed heat rate. Specific power on the I.D. fan was well belaw rated values, due to the low system pressure drop af 535 MM W.G. at 116% rated capacity.
- The Loesche-Mill circuit is a 3 fan system which has run at aver 200 MTPH at 11% sieve residue on 75 micron, or well above rating. It is normally run at substantial turn-down for $SO_x$ scrubbing. Gas bypassing the mill is scrubbed by an Ashgrove sorbent metering system.

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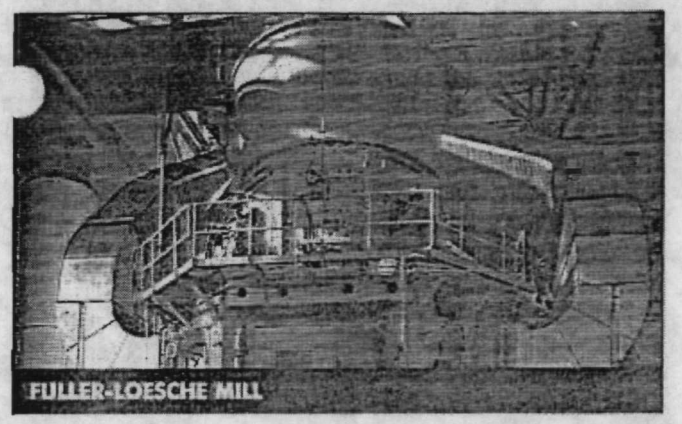
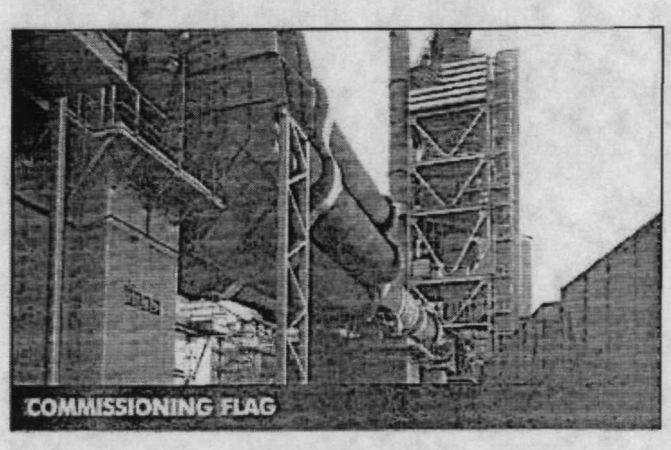
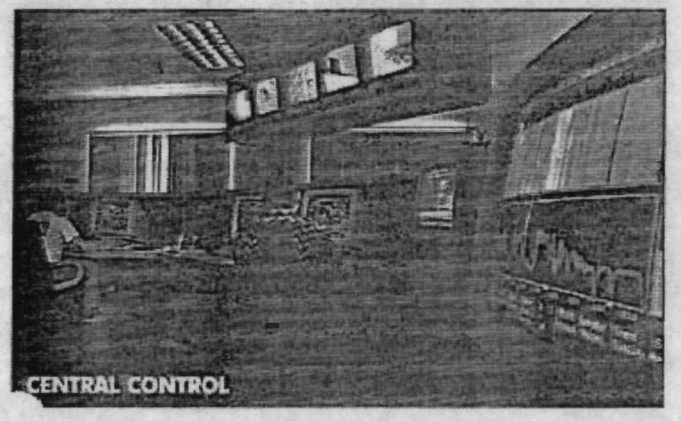


FULLER-LOESCHE MILL

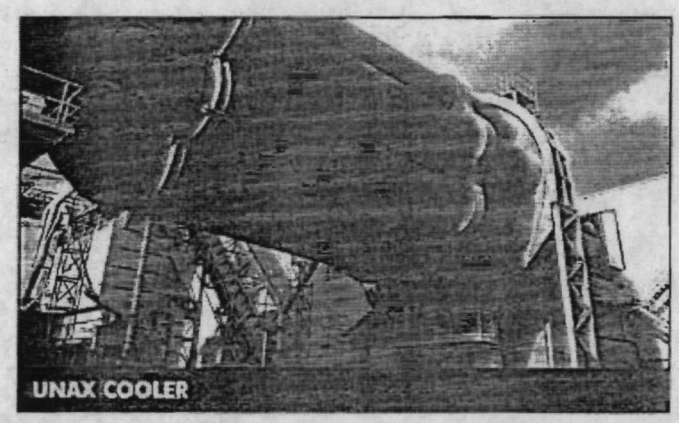


COMMISSIONING FLAG

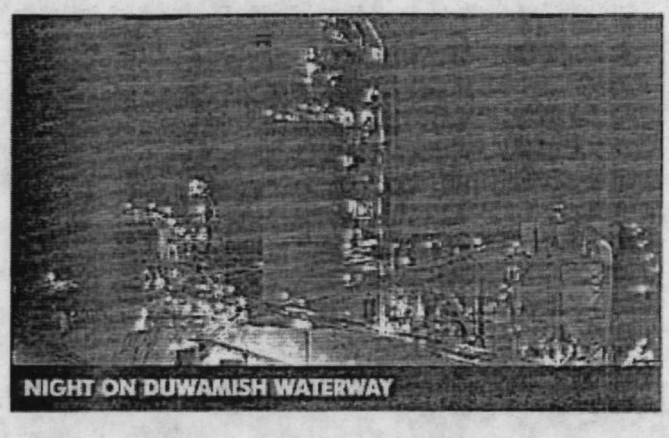


CENTRAL CONTROL

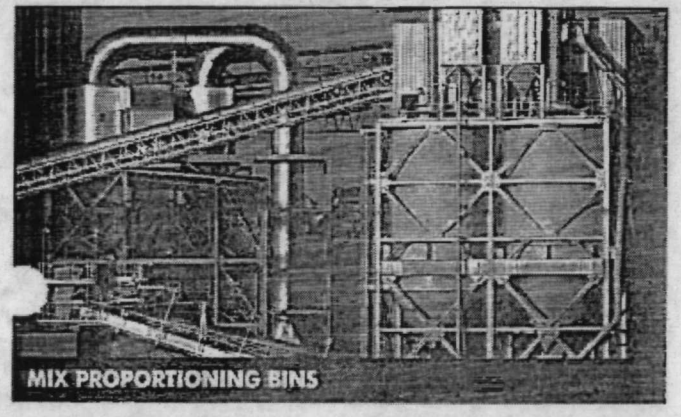
2500HP FINISH MILL



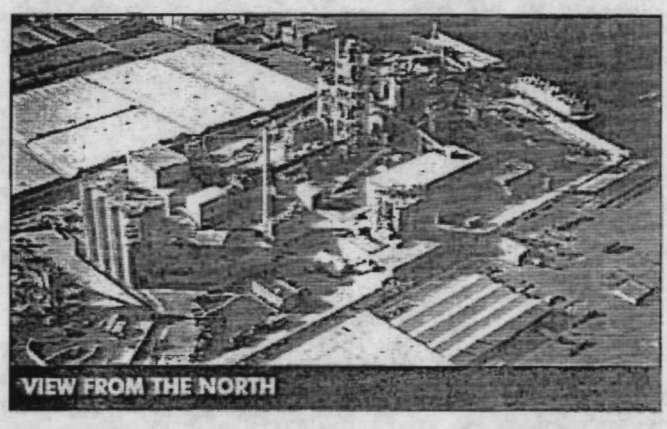
UNAX COOLER



NIGHT ON DUWAMISH WATERWAY



MIX PROPORTIONING BINS



VIEW FROM THE NORTH

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